IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.: 10/750,346
Filed: December 31, 2003
Inventor(s):
Nadel, et al.

Title: Object-Level Database Performance Management

§

Examiner: Rose, Helene Roberta
Group/Art Unit: 2163
Atty. Dkt. No: 5760-14700

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B. Noël Kivlin
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Date

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Respectfully submitted,

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March 19, 2007
Date

APPEAL BRIEF

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir/Madam:

Further to the Notice of Appeal filed January 16, 2007, Appellants present this Appeal Brief. Appellants respectfully request that this appeal be considered by the Board of Patent Appeals and Interferences.

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I. REAL PARTY IN INTEREST

The present application is owned by Precise Software Solutions Ltd., a corporation having an office and place of business at 10 Hata'asiya Street, Or-Yehuda, Israel 60408.

II. RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences known to Appellants, Appellants' legal representatives, or assignee which will directly affect, be directly affected by, or have a bearing on the Board's decision in the pending appeal.

III. STATUS OF CLAIMS

Claims 1 – 25 are pending. Claims 1 – 25 are rejected, and the rejection of these claims is being appealed. A copy of claims 1 – 25 is included in the Claims Appendix attached hereto.

IV. STATUS OF AMENDMENTS

No amendments to the claims have been submitted subsequent to the final rejection.

V. SUMMARY OF CLAIMED SUBJECT MATTER

Independent claim 1 is directed to a method for tuning database objects, the method comprising: collecting and storing performance data (*see, e.g.*, Fig. 1, reference characters 104a and 110; Fig. 3, reference characters 104, 110, and 316; Fig. 4, reference characters 402, 404, and 406; page 6, line 27 to page 7, line 12; page 8, lines 19-23; page 11, lines 20-24; page 12, line 1 to page 13, line 18) for a plurality of database objects in a database server computer system, wherein each of the plurality of database objects comprises an aggregation of stored data (*see, e.g.*, Fig. 3, reference characters 310 and 312; page 10, lines 3-19); detecting a performance problem in the database server computer system (*see, e.g.*, Fig. 4, reference character 408; page 13, lines 20-28); identifying a problematic database object of the plurality of database objects using the performance data for the plurality of database objects, wherein the problematic database object is related to the performance problem (*see, e.g.*, Fig. 3, reference character 320; Fig. 4, reference character 410; page 13, line 30 to page 14, line 21); and tuning the problematic database object to improve performance of access to the stored data in the database server computer system (*see, e.g.*, Fig. 3, reference character 330; Fig. 4, reference character 412; page 11, lines 26-28; page 14, line 23 to page 15, line 3).

Independent claim 9 is directed to a computer-readable storage medium comprising program instructions (*see, e.g.*, Fig. 2, reference characters 100, 220, 258, and 260; page 8, line 25 to page 9, line 16; page 15, lines 5-10), wherein the program instructions are computer-executable to implement: collecting and storing performance data (*see, e.g.*, Fig. 1, reference characters 104a and 110; Fig. 3, reference characters 104, 110, and 316; Fig. 4, reference characters 402, 404, and 406; page 6, line 27 to page 7, line 12; page 8, lines 19-23; page 11, lines 20-24; page 12, line 1 to page 13, line 18) for a plurality of database objects in a database server computer system, wherein each of the plurality of database objects comprises an aggregation of stored data (*see, e.g.*, Fig. 3, reference characters 310 and 312; page 10, lines 3-19); detecting a performance problem in the database server computer system (*see, e.g.*, Fig. 4, reference character 408; page 13, lines 20-28); identifying a problematic database object of the plurality of database

objects using the performance data for the plurality of database objects, wherein the problematic database object is related to the performance problem (*see, e.g.*, Fig. 3, reference character 320; Fig. 4, reference character 410; page 13, line 30 to page 14, line 21); and tuning the problematic database object to improve performance of access to the stored data in the database server computer system (*see, e.g.*, Fig. 3, reference character 330; Fig. 4, reference character 412; page 11, lines 26-28; page 14, line 23 to page 15, line 3).

Independent claim 17 is directed to a performance management system (*see, e.g.*, Figs. 1 and 2, reference character 100; page 5, line 3 to page 8, line 23) comprising a database server comprising a plurality of database objects, wherein each of the plurality of database objects comprises an aggregation of stored data (*see, e.g.*, Fig. 3, reference characters 310 and 312; page 10, lines 3-19), and a performance warehouse which stores performance data for the plurality of database objects (*see, e.g.*, Fig. 1, reference character 110; Fig. 3, reference characters 110 and 316; Fig. 4, reference characters 402, 404, and 406; page 6, line 27 to page 7, line 12; page 8, lines 19-23; page 11, lines 20-24; page 12, line 1 to page 13, line 18). The performance management system is configured to: detect a performance problem in the database server (*see, e.g.*, Fig. 4, reference character 408; page 13, lines 20-28); identify a problematic database object of the plurality of database objects using the performance data for the plurality of database objects, wherein the problematic database object is related to the performance problem (*see, e.g.*, Fig. 3, reference character 320; Fig. 4, reference character 410; page 13, line 30 to page 14, line 21); and tune the problematic database object to improve performance of access to the stored data in the database server (*see, e.g.*, Fig. 3, reference character 330; Fig. 4, reference character 412; page 11, lines 26-28; page 14, line 23 to page 15, line 3).

Independent claim 25 is directed to a system for tuning database objects, the system comprising: means for collecting and storing performance data (*see, e.g.*, Fig. 1, reference characters 100, 104a and 110; Fig. 2, reference characters 100, 210, 220, 252, 254, 258, 260; Fig. 3, reference characters 104, 110, and 316; Fig. 4, reference characters 402, 404, and 406; page 6, line 3 to page 10, line 19; page 11, lines 20-24; page 12, line 1

to page 13, line 18) for a plurality of database objects in a database server computer system, wherein each of the plurality of database objects comprises an aggregation of stored data (*see, e.g.*, Fig. 3, reference characters 310 and 312; page 10, lines 3-19); means for detecting a performance problem in the database server computer system (*see, e.g.*, Fig. 1, reference characters 100 and 110; Fig. 2, reference characters 100, 210, 220, 252, 254, 258, 260; Fig. 3, reference characters 110, 310, 312, 316, and 320; Fig. 4, reference character 408; page 6, line 3 to page 10, line 19; page 13, lines 20-28); means for identifying a problematic database object of the plurality of database objects using the performance data for the plurality of database objects, wherein the problematic database object is related to the performance problem (*see, e.g.*, Fig. 1, reference character 100; Fig. 2, reference characters 100, 210, 220, 252, 254, 258, 260; Fig. 3, reference characters 110, 310, 312, 316, and 320; Fig. 4, reference character 410; page 6, line 3 to page 10, line 19; page 13, line 30 to page 14, line 21); and means for tuning the problematic database object to improve performance of access to the stored data in the database server computer system (*see, e.g.*, Fig. 1, reference character 100; Fig. 2, reference characters 100, 210, 220, 252, 254, 258, 260; Fig. 3, reference characters 310, 312, and 330; Fig. 4, reference character 412; page 6, line 3 to page 10, line 19; page 11, lines 26-28; page 14, line 23 to page 15, line 3).

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

1. Claims 1 – 25 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Risch (U.S. Pat. No. 5,471,629).

VII. ARGUMENT

First Ground of Rejection:

Claims 1 – 25 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Risch (U.S. Pat. No. 5,471,629). Appellants traverse this rejection for the following reasons. Different groups of claims are discussed under their respective subheadings.

Claims 1, 5 – 9, 13 – 17, and 21 – 25:

Appellants respectfully submit that Risch fails to teach or suggest a method comprising "tuning the problematic database object to improve performance of access to the stored data in the database server computer system" in combination with the remaining features of claim 1. Risch discloses a method for monitoring database objects using a database monitor such that clients are notified of database changes at an optimal rate. The database monitor disclosed by Risch may be configured using four tuning parameters: a change significance parameter, a tracking delay time parameter, a nervousness parameter, and a synchronous initiation parameter (see, e.g., col. 10, lines 58 – 62). It is the monitor itself, not a problematic database object, that is tuned in Risch (see, e.g., col. 11, lines 13 – 14). Furthermore, the monitor is tuned for optimal notification of the monitor's clients (see, e.g., col. 7, lines 15 – 21), not "to improve performance of access to the stored data in the database server computer system."

In section 5 of the Final Office Action, the Examiner states that the recitation "tuning the problematic database object to improve performance of access to the stored data in the database server computer system" has not been given patentable weight because it occurs in the preamble. Appellants submit that the case law cited by the Examiner (*In re Hirao*, 535 F.2d 67, 190 USPQ 15 [CCPA 1976] and *Kropa v. Robie*, 187 F.2d 150, 152, 88 USPQ 478, 481 [CCPA 1951]) is not relevant because the recitation at issue does indeed occur in the body of claim 1, not the preamble.

Anticipation requires the presence of each and every limitation of the claimed invention, arranged as in the claim, in a single prior art reference. M.P.E.P 2131; *Lindemann Maschinenfabrik GmbH v. American Hoist & Derrick Co.*, 221 USPQ 481, 485 (Fed. Cir. 1984). The identical invention must be shown in as complete detail as is contained in the claims. *Richardson v. Suzuki Motor Co.*, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989). As discussed above, Risch fails to disclose a method comprising "tuning the problematic database object to improve performance of access to the stored data in the database server computer system" in combination with the remaining features of claim 1. Therefore, Risch cannot be said to anticipate claim 1.

Accordingly, claim 1 and its dependent claims 5 – 8 are believed to patentably distinguish over Risch for at least the reasons given above. Claims 9, 17, and 25 recite features similar to those of claim 1 and are therefore believed to patentably distinguish over Risch for at least the reasons given above. Dependent claims 13 – 16 and 21 – 24 are also believed to patentably distinguish over Risch for similar reasons.

Claims 2, 10, and 18:

Appellants respectfully submit that Risch fails to teach or suggest a method "wherein tuning the problematic database object to improve performance of access to the stored data in the database server computer system comprises moving the problematic database object from nonvolatile storage to volatile storage for improved speed of access" in combination with the remaining features of claims 1 and 2. In rejecting claim 2, the Final Office Action cites various passages in Risch including col. 14, lines 58-65 (disclosing the deletion and modification of tables) and col. 15, lines 9-22 (disclosing an example of a computer system having storage). Although Risch discloses the deletion and modification of tables, there is no teaching or suggestion in Risch that a problematic database object is moved from nonvolatile storage to volatile storage for improved speed of access. Appellants therefore submit that the rejection of claim 2 is not supported by the cited art. For similar reasons, claims 10 and 18 are also believed to patentably distinguish over Risch.

Claims 3, 11, and 19:

Appellants respectfully submit that Risch fails to teach or suggest a method "wherein tuning the problematic database object to improve performance of access to the stored data in the database server computer system comprises creating a new access path to the problematic database object" in combination with the remaining features of claims 1 and 3. In rejecting claim 3, the Final Office Action cites Fig. 4, element 403 of Risch ("create and optimize partial view materialization paths"). Risch discusses this element at col. 9, lines 25-31:

> Preferably, a partial view materialization path for a given attribute is created in advance of any request to monitor that attribute. This is done during a "Create View" procedure as depicted in FIG. 4. The Create View procedure is a relatively high-overhead task which is ordinarily performed during creation of the database or if necessary at other times, preferably when the system is not otherwise busy.

Risch thus teaches that element 403 is part of a technique that is preferably performed in advance of any request to monitor that attribute and during creation of the database. Accordingly, there is no teaching or suggestion in Risch that this technique is applicable to tuning a database object that has been identified as a problematic database object. Appellants therefore submit that the rejection of claim 3 is not supported by the cited art. For similar reasons, claims 11 and 19 are also believed to patentably distinguish over Risch.

Claims 4, 12, and 20:

Appellants respectfully submit that Risch fails to teach or suggest a method "wherein tuning the problematic database object to improve performance of access to the stored data in the database server computer system comprises moving the problematic database object from heavily loaded storage components to less loaded storage components" in combination with the remaining features of claims 1 and 4. In rejecting

claim 4, the Final Office Action cites col. 15, line 29, where Risch discloses that "some of the software and data are actually resident in mass storage and are called into main memory as needed." The Final Office Action also cites and Fig. 6, element 323, where Risch discloses the determination of whether a monitored value has changed by a minimum amount. However, there is no teaching or suggestion in Risch that the determination of a minimum change in a monitored value relates in any way to the issue of whether software and data are maintained in mass storage or main memory. Additionally, there is no teaching or suggestion in Risch that mass storage is "heavily loaded storage" while main memory is "less loaded storage." Appellants therefore submit that the rejection of claim 4 is not supported by the cited art. For similar reasons, claims 12 and 20 are also believed to patentably distinguish over Risch.

For the foregoing reasons, it is submitted that the Examiner's rejection of claims 1 – 25 was erroneous, and reversal of the decision is respectfully requested.

The Commissioner is authorized to charge the appeal brief fee of $500.00 and any other fees that may be due to Meyertons, Hood, Kivlin, Kowert, & Goetzel, P.C. Deposit Account No. 50-1505/5760-14700/BNK. This Appeal Brief is submitted with a return receipt postcard.

Respectfully submitted,

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Date: March 19, 2007

VIII. CLAIMS APPENDIX

The claims on appeal are as follows.

1. A method for tuning database objects, the method comprising:

collecting and storing performance data for a plurality of database objects in a database server computer system, wherein each of the plurality of database objects comprises an aggregation of stored data;

detecting a performance problem in the database server computer system;

identifying a problematic database object of the plurality of database objects using the performance data for the plurality of database objects, wherein the problematic database object is related to the performance problem; and

tuning the problematic database object to improve performance of access to the stored data in the database server computer system.

2. The method of claim 1,

wherein tuning the problematic database object to improve performance of access to the stored data in the database server computer system comprises moving the problematic database object from nonvolatile storage to volatile storage for improved speed of access.

3. The method of claim 1,

wherein tuning the problematic database object to improve performance of access to the stored data in the database server computer system comprises creating a new access path to the problematic database object.

4. The method of claim 1,

wherein tuning the problematic database object to improve performance of access to the stored data in the database server computer system comprises moving the problematic database object from heavily loaded storage components to less loaded storage components.

5. The method of claim 1,

wherein the performance data comprises an I/O wait.

6. The method of claim 1,

wherein the performance data comprises an application lock wait.

7. The method of claim 1,

wherein the performance data comprises a resource contention.

8. The method of claim 1, further comprising:

correlating the collected performance data to specific database objects of the plurality of database objects.

9. A computer-readable storage medium comprising program instructions, wherein the program instructions are computer-executable to implement:

collecting and storing performance data for a plurality of database objects in a database server computer system, wherein each of the plurality of database objects comprises an aggregation of stored data;

detecting a performance problem in the database server computer system;

identifying a problematic database object of the plurality of database objects using the performance data for the plurality of database objects, wherein the

problematic database object is related to the performance problem; and

tuning the problematic database object to improve performance of access to the stored data in the database server computer system.

10. The computer-readable storage medium of claim 9,

wherein tuning the problematic database object to improve performance of access to the stored data in the database server computer system comprises moving the problematic database object from nonvolatile storage to volatile storage for improved speed of access.

11. The computer-readable storage medium of claim 9,

wherein tuning the problematic database object to improve performance of access to the stored data in the database server computer system comprises creating a new access path to the problematic database object.

12. The computer-readable storage medium of claim 9,

wherein tuning the problematic database object to improve performance of access to the stored data in the database server computer system comprises moving the problematic database object from heavily loaded storage components to less loaded storage components.

13. The computer-readable storage medium of claim 9,

wherein the performance data comprises an I/O wait.

14. The computer-readable storage medium of claim 9,

wherein the performance data comprises an application lock wait.

15. The computer-readable storage medium of claim 9,

wherein the performance data comprises a resource contention.

16. The computer-readable storage medium of claim 9, wherein the program instructions are further computer-executable to implement:

correlating the collected performance data to specific database objects of the plurality of database objects.

17. A performance management system, comprising:

a database server comprising a plurality of database objects, wherein each of the plurality of database objects comprises an aggregation of stored data; and

a performance warehouse which stores performance data for the plurality of database objects;

wherein the performance management system is configured to:

detect a performance problem in the database server;

identify a problematic database object of the plurality of database objects using the performance data for the plurality of database objects, wherein the problematic database object is related to the performance problem; and

tune the problematic database object to improve performance of access to the stored data in the database server.

18. The performance management system of claim 17,

wherein tuning the problematic database object to improve performance of access to the stored data in the database server comprises moving the problematic database object from nonvolatile storage to volatile storage for improved

speed of access.

19. The performance management system of claim 17,

wherein tuning the problematic database object to improve performance of access to the stored data in the database server comprises creating a new access path to the problematic database object.

20. The performance management system of claim 17,

wherein tuning the problematic database object to improve performance of access to the stored data in the database server comprises moving the problematic database object from heavily loaded storage components to less loaded storage components.

21. The performance management system of claim 17,

wherein the performance data comprises an I/O wait.

22. The performance management system of claim 17,

wherein the performance data comprises an application lock wait.

23. The performance management system of claim 17,

wherein the performance data comprises a resource contention.

24. The performance management system of claim 17,

wherein the performance data is correlated to specific database objects of the plurality of database objects.

25. A system for tuning database objects, the system comprising:

means for collecting and storing performance data for a plurality of database objects in a database server computer system, wherein each of the plurality of database objects comprises an aggregation of stored data;

means for detecting a performance problem in the database server computer system;

means for identifying a problematic database object of the plurality of database objects using the performance data for the plurality of database objects, wherein the problematic database object is related to the performance problem; and

means for tuning the problematic database object to improve performance of access to the stored data in the database server computer system.

IX. EVIDENCE APPENDIX

No evidence submitted under 37 CFR §§ 1.130, 1.131, or 1.132 or otherwise entered by the Examiner is relied upon in this appeal.

X. RELATED PROCEEDINGS APPENDIX

There are no related proceedings known to Appellants, Appellants' legal representatives, or assignee which will directly affect, be directly affected by, or have a bearing on the Board's decision in the pending appeal.